

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently amended) A process of removing H₂S from an H₂S-containing gas stream comprising:

forming a reactant gas mixture comprising said H₂S-containing gas and O₂;

~~at a~~ maintaining the temperature of said reactant gas mixture greater than the dew point of elemental sulfur,

_____ flowing a stream of said reactant gas mixture over a catalyst device in a reaction zone such that the contact time of each portion of reactant gas mixture that contacts said catalyst device is less than 200 milliseconds, ~~sufficiently brief to allow whereby~~ the reaction $\text{H}_2\text{S} + 1/2 \text{O}_2 \rightarrow 1/x \text{S}_x + \text{H}_2\text{O}$ (x = 2, 6 or 8) ~~occurs to occur whereby, forming~~ a product stream ~~is formed~~ comprising gaseous elemental sulfur and water;

passing said product stream into a cooling zone and cooling said product stream to the dewpoint temperature of elemental sulfur, or lower, such that sulfur is condensed from said product stream; and

recovering said condensed elemental sulfur from said cooling zone.

2. (Currently amended) The process of claim 1 wherein said H₂S-containing gas stream comprises another gaseous component, and the process comprising comprises recovering a desired said other gaseous component product from said product stream.

3. (Original) The process of claim 1 wherein said step of flowing a stream of said reactant gas mixture over a catalyst in a reaction zone at a temperature greater than the dew point of elemental sulfur includes keeping the temperature of the catalyst device and/or the reactant gas mixture sufficiently high to deter or prevent sulfur poisoning of said catalyst device.

4. (Currently amended) The process of claim 1 comprising providing a millisecond contact time reactor having a gas mixing zone, a reaction zone capable of withstanding temperatures up to at least 1,500°C, and a cooling zone,

wherein said step of forming a reactant gas mixture comprises providing a H₂S-containing gas stream comprising up to 100% H₂S, and, optionally, another gaseous component, and providing a O₂-containing gas stream; and

wherein said step of flowing a stream of said reactant gas mixture over a catalyst in a reaction zone comprises ~~in a millisecond contact time reactor having a gas mixing zone, a reaction zone capable of withstanding temperatures up to at least 1,500°C, and a cooling zone~~, mixing together said H₂S-containing gas stream and said O₂-containing gas stream in said mixing zone to form a stream of reactant gas mixture, said reaction zone containing a catalyst device having activity for catalyzing the direct partial oxidation of H₂S to elemental sulfur and water; maintaining the temperature of said mixing and reaction zones above the dewpoint of sulfur; and forming a product stream comprising gaseous elemental sulfur, and, optionally, a desired said other gaseous component product; and

wherein, said process optionally includes recovering said ~~desired~~ other gaseous ~~product~~ component from said product stream.

5. (Original) The process of claim 4 comprising maintaining an approximately 2:1 molar ratio of H₂S to O₂ in said reactant gas mixture.

6. (Original) The process of claim 4 comprising keeping the temperature of said catalyst device at about 700°C-1,500°C.

7. (Original) The process of claim 4 wherein said step of providing a H₂S-containing gas stream comprises providing an H₂S-containing light hydrocarbon stream; and said process further comprises recovering an at least partially desulfurized light hydrocarbon stream.

8. (Original) The process of claim 4 wherein said step of providing a H₂S-containing gas stream comprises providing an H₂/H₂S-containing gas stream; and said process further comprises recovering an at least partially desulfurized H₂ stream.

9. (Original) The process of claim 4 comprising initially heating said catalyst device to at least about 700°C while passing said reactant gas mixture over said catalyst device until said reaction is initiated.

10. (Original) The process of claim 9 comprising maintaining reaction promoting conditions such that said reaction continues autothermally.
11. (Original) The process of claim 4 comprising maintaining the temperature of said reactant gas mixture at least about 200°C prior to entry of said reactant gas stream into the reaction zone of said reactor.
12. (Original) The process of claim 4 wherein said O₂-containing gas is chosen from the group consisting of purified O₂, air, and O₂ enriched air.
13. (Original) The process of claim 4 wherein said reactor comprises a porous thermal shield disposed between said mixing zone and said reaction zone.
14. (Original) The process of claim 1 wherein said catalyst device comprises at least one structure chosen from the group consisting of gauzes, monoliths and a plurality of divided units.
15. (Original) The process of claim 14 wherein said divided units comprise particles, granules, beads, pills, pellets, cylinders, trilobes, extrudates or spheres.
16. (Currently amended) The process of claim 1 wherein said catalyst device comprises at least one catalytic metal having activity for catalyzing the reaction $\text{H}_2\text{S} + 1/2 \text{O}_2 \rightarrow 1/x \text{S}_x + \text{H}_2\text{O}$ (x = 2, 6 or 8).
17. (Currently amended) The process of claim 16 wherein said catalyst device comprises at least one catalytic metal chosen from the group consisting of platinum, rhodium, ruthenium, iridium, nickel, palladium, iron, cobalt, rhenium and rubidium.
18. (Currently amended) The process of claim 17 wherein said catalyst device comprises at least one catalytic metal chosen from the group consisting of platinum, rhodium, ruthenium, nickel, palladium and iridium.

19. (Currently amended) The process of claim 18 wherein said ~~catalyst device~~catalytic metal comprises platinum, rhodium or a mixture thereof.
20. (Currently amended) The process of claim 16 wherein said ~~catalyst device~~catalytic metal comprises vanadium, bismuth or antimony.
21. (Original) The process of claim 16 wherein said catalyst device comprises at least one lanthanide element chosen from the group consisting of La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu.
22. (Original) The process of claim 21 wherein said lanthanide element is samarium, ytterbium or praseodymium.
23. (Original) The process of claim 14 wherein said structure comprises a refractory support.
24. (Original) The process of claim 23 wherein said catalyst device comprises zirconia, alpha-alumina or a metal oxide of a lanthanide.
25. (Original) The process of claim 23 wherein said catalyst device comprises platinum and a lanthanide metal oxide chosen from the group consisting of cerium oxide and lanthanum oxide.
26. (Original) The process of claim 23 wherein said catalyst device comprises rhodium and samarium oxide.
27. (Original) The process of claim 23 wherein said catalyst device comprises a platinum-rhodium alloy disposed on a lanthanide oxide coated refractory support.
28. (Original) The process of claim 27 wherein said catalyst device comprises samarium oxide.
29. (Currently amended) The process of claim 16 wherein said catalyst device comprises at least one catalytic carbided metal.

30. (Original) The process of claim 29 wherein said at least one carbided metal comprises platinum and rhodium.

31-35. (Canceled)

36. (Original) The process of claim 1 wherein said contact time is no more than about 200 milliseconds.

37. (Original) The process of claim 36 wherein said contact time is less than 50 milliseconds.

38. (Original) The process of claim 37 wherein said contact time is less than 20 milliseconds.

39. (Original) The process of claim 38 wherein said contact time is 10 milliseconds or less.

40. (Original) The process of claim 1 comprising operating said process at superatmospheric reactant gas pressure.

41. (New) A process of removing H₂S from an H₂S-containing gas stream comprising:
providing a stream of H₂S-containing gas comprising about 0.5 to 100 vol% H₂S, and, optionally, another gaseous component;
forming a reactant gas mixture comprising said H₂S-containing gas, O₂, and, optionally, said other gaseous component;
contacting said reactant gas mixture with a catalyst device at a contact time of 200 milliseconds or less, such that a product gas stream is formed comprising elemental sulfur, water, and, optionally, said other gaseous component, wherein said catalyst device is active for catalyzing the partial oxidation of H₂S to form elemental sulfur and water, and, if said other gaseous component is present in said reactant gas mixture, said catalyst device is more selective for catalyzing the partial oxidation of H₂S than for catalyzing the combustion or partial oxidation of said other gaseous component;
maintaining the temperature of said catalyst device above 500°C during said contacting;
condensing elemental sulfur from said product gas stream; and,
optionally, recovering said other component from said product gas stream.

42. (New) The process of claim 41 wherein said H₂S-containing gas comprises about 3 - 25 vol% H₂S.
43. (New) The process of claim 42 wherein said H₂S-containing gas comprises up to about 40 vol% H₂S.
44. (New) The process of claim 1 comprising providing in said reactant gas mixture no more than about a stoichiometric amount of O₂ to support said reaction.
45. (New) The process of claim 2 wherein said other gaseous component comprises H₂.
46. (New) The process of claim 2 wherein said other gaseous component comprises at least one hydrocarbon.
47. (New) The process of claim 46 wherein said catalyst device comprises a catalyst material that is more selective for catalyzing the partial oxidation of H₂S according to said reaction than for catalyzing the combustion or partial oxidation of said hydrocarbon.
48. (New) A process of recovering elemental sulfur from an H₂S-containing gas stream comprising:
- forming a reactant gas mixture comprising said H₂S-containing gas and O₂;
 - maintaining the temperature of said reactant gas mixture above the dew point of elemental sulfur,
 - contacting said reactant gas mixture with a catalyst device at a temperature in the range of about 900°C to about 1,300°C, to form a product gas stream comprising elemental sulfur and water, said contacting comprising a contact time of up to about 10 milliseconds;
 - cooling said product stream to the dewpoint temperature of elemental sulfur, or lower, such that sulfur is condensed from said product stream; and
 - recovering said condensed elemental sulfur.

49. (New) The process of claim 1 wherein flowing said stream of said reactant gas mixture over said catalyst device comprises a GHSV of at least about 100,000 h⁻¹.